Amendments to the Drawings:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An electrostatic valve device for an integrated microfluidic chip comprising:

a substrate;

a first microfluidic channel disposed on the substrate and formed from a polymer layer;

a second microfluidic channel disposed on the substrate and formed from a polymer layer;

a polymer based diaphragm coupled between the first microfluidic channel and the second microfluidic channel;

an orifice disposed within a portion of the polymer diaphragm, the orifice being adapted to provide fluid communication between the first microfluidic channel and the second microfluidic channel;

a first electrode coupled to the substrate;

a second electrode coupled to the polymer based diaphragm and separated from the first electrode by the first microfluidic channel; and

a power source coupled between the first electrode and the second electrode, the power source being adapted to actuate the diaphragm to block fluid communication between the first microfluidic channel and the second microfluidic channel through the orifice.

2. (currently amended) The device of claim 1 wherein the first microfluidic channel and the second microfluidic channel contain liquid.

3. (currently amended) The device of claim 1 wherein the first microfluidic channel and the second microfluidic channel contain gas.

4. (previously presented) The device of claim 1 wherein at least one of the first and second microfluidic channels [is] are characterized by a height of less than 5 micron.

5. (currently amended) The device of claim 1 wherein both the first and second microfluidic channels are characterized by a height of equal or larger than 5 micron.

6. (currently amended) The device of claim 1 wherein first microfluidic channel has a height that is different from a height of the second microfluidic channel.

7. (previously presented) The device of claim 1 wherein the polymer based diaphragm has a diameter ranging from 10 to 1000 micron.

8. (previously presented) The device of claim 1 wherein the polymer diaphragm is characterized by a diameter larger than 1000 micron.

9. (previously presented) The device of claim 1 wherein the polymer diaphragm is characterized by a thickness ranging from 0.1 to 10 micron.

10. (previously presented) The device of claim 1 wherein the polymer based diaphragm is characterized by a thickness of larger than 10 micron.

11. (previously presented) The device of claim 1 wherein the second electrode is embedded within the polymer based diaphragm.

12. (previously presented) The device of claim 1 wherein the substrate is made of a material selected from silicon or glass.

13. (previously presented) The device of claim 1 wherein the polymer based diaphragm comprises a material selected from parylene, polyimide, or silicone.

14. (previously presented) The device of claim 1 wherein at least one of the first and second electrodes comprises a conducting material selected from the group consisting of chrome, gold, aluminum, titanium, platinum, and doped polysilicon.

15. (previously presented) The device of claim 1 further comprising a flow sensor coupled to one of the first and the second flow channels, the flow sensor configured to provide flow measurement information to the valve to achieve feedback flow control.

16. (withdrawn) A method for fabricating a micro fluidic device, the method comprising:

providing a substrate;

forming a first electrically conducting layer overlying the substrate;

patterning the first electrode layer to form a first electrode element;

forming a first polymer based layer overlying the first electrode element and the substrate;

forming a first sacrificial layer overlying the first polymer based layer;

forming a second polymer based layer overlying the first sacrificial layer, the second polymer layer defining an aperture;

forming a second electrically conducting layer overlying the first polymer based layer;

patterning the second electrode layer to form a second electrode element associated with the first electrode element, the second electrode layer excluded from the aperture;

forming a third polymer based layer overlying the second electrode element to sandwich the second electrode element between the second polymer based layer and the third polymer based layer, the third polymer based layer also excluded from the aperture;

forming a second sacrificial layer overlying the third polymer based layer and the first sacrificial layer within the aperture;

forming a fourth polymer based layer overlying the second sacrificial layer;

and

releasing the first and second sacrificial layers to define respective first and second flow channels in fluid communication through the aperture.

17. (withdrawn) The method of claim 16 wherein forming the first and second sacrificial layers comprises patterning photoresist.

18. (withdrawn) The method of claim 17 wherein releasing the first and second sacrificial layers comprises exposing the first and second sacrificial layers to acetone.

19. (withdrawn) The method of claim 18 further comprising exposing the first and second sacrificial layers to isopropyl alcohol once the first and second flow channels have been substantially defined.

20. (withdrawn) The method of claim 16 wherein the first polymer based layer, the second polymer based layer, and third polymer based layer are provided using chemical vapor deposition of Parylene.

21. (withdrawn) The method of claim 16 wherein:

patterning the second electrode layer also forms a heating element, the heating element in thermal communication with one of the first and the second flow channel; and

releasing the first sacrificial layer defines a cavity providing thermal isolation of the heating element.

22. (withdrawn) A method of controlling a flow of fluid comprising:

providing a first polymer based layer overlying a first electrode supported by a substrate;

defining a flow channel between the first polymer layer and a diaphragm comprising a second electrode sandwiched between second and third polymer based layers, the second electrode and second and third polymer based layers defining an aperture; and

selectively applying a potential difference between the first and second electrodes to draw the second electrode toward the first electrode, thereby causing the diaphragm to seat on the first polymer layer and block a flow of fluid through the aperture.

23. (withdrawn) The method of claim 22 further comprising:

defining a thermal isolation cavity between the first polymer layer and a heating element sandwiched between the second and third polymer layers and in thermal communication with the flow channel;

detecting a voltage channel in the heating element reflecting a velocity of fluid flow through the flow channel; and

changing the potential difference based on the voltage change.

24. (withdrawn) The method of claim 22 wherein defining the flow channel comprises:

patterning a first sacrificial layer over the first polymer layer;

forming a second sacrificial layer in the aperture over a first sacrificial layer; and

removing the first and second sacrificial layers.

25. (withdrawn) The method of claim 24 wherein:

patterning a first and second sacrificial layers comprises patterning photoresist; and

removing the first and second sacrificial layers comprises introducing acetone.

26. (withdrawn) The method of claim 22 wherein the first polymer based layer, the second polymer based layer, and the third polymer based layer are provided using chemical vapor deposition of Parylene.